4 Land Protection

4.1 Land Use/Land Cover in the DCR/DWSP Watersheds

Land use and development patterns in a watershed influence the hydrology and water quality of its streams and lakes/reservoirs. They are important considerations in determining appropriate protection measures for watersheds. Generalized land use/land cover categories, and population density for the Wachusett, Quabbin, and Ware watersheds are shown in Table 2. Land Use for the Ware River is mapped in Figure 3.

TABLE 2: LAND USE/LAND COVER BY PERCENT (EXCLUDING RESERVOIR SURFACE AREAS)

Land Use/Land Cover	Quabbin Reservoir	Ware River	Wachusett Reservoir
Forest	87%	74.7%	67%
Wetland	6%	11.4%	8%
Agriculture	3%	4.7%	8%
Residential	1%	3.3%	9%
Commercial/Industrial	0.1%	0.7%	0.6%
Open Water	0.3%	2.6%	2%
Other	3%	2.6%	7%
Persons per sq.mi.	***16***	*77*	***284***

Although the watershed system is sparsely developed, the level of developed land is lowest in the Quabbin watershed and becomes more developed and populated eastward to the Wachusett watershed. Note that no wastewater treatment plants or industrial discharges exist within any of the three watersheds.

4.2 Protected Lands in the DCR/DWSP Watersheds

Overall, the Division directly controls about 42% of the entire watershed system, exclusive of the reservoirs themselves. The Division controls approximately 57% of the Quabbin watershed, 38% of the Ware River watershed and 26% of the Wachusett watershed (Table 3). Other state agencies, non-profit land conservation organizations and municipalities own and protect another 21% of the combined watersheds.

FIGURE 3: WARE RIVER LAND USE/LAND COVER MAP

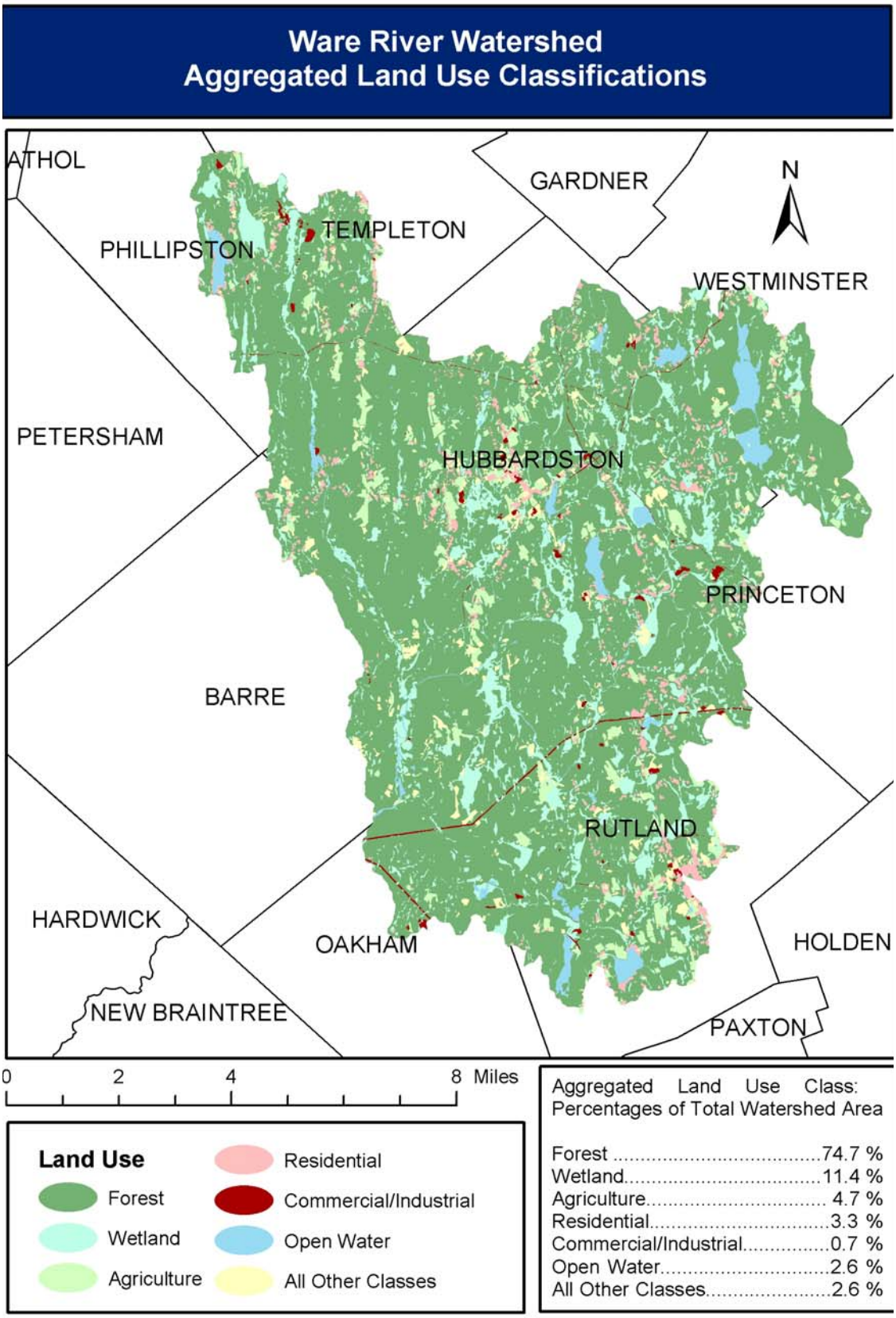


TABLE 3: DCR/DWSP AND OTHER PROTECTED LAND

	Open Space as % of Watershed*		
Watershed	DWSP-Controlled	Other Protected**	Total Protected
Quabbin Reservoir	57	18	75
Ware River	38	20	58
Wachusett Reservoir	26	26	52
Combined	42	21	63

* Watershed area excluding reservoir surface.
** Includes lands owned by other state agencies, local government, and private entities.

There is a long history of interagency cooperation among those agencies with a stake in the lands on the Ware River watershed. The Division of Fish and Game signed a cooperative agreement with the MDC in 1956 and established the Barre Falls and Hubbardston Management Areas. The MDC did habitat restoration work by reclaiming approximately 40 acres of overgrown field in the1960s and 1970s. More recently, MassWildlife evaluated many sites on the watershed for inclusion in the Upland Habitat Restoration Program, which is designed to respond to the loss of early successional habitat across the state by returning sites to early seral stages.

The Army Corps of Engineers owns 500 acres of land (acquired from MDC in 1953) in the center of Division holdings, and leases approximately 1,800 acres of Division property for emergency flood storage. These two agencies cooperate on a number of activities that include flood control, access control, road and bridge maintenance, and habitat restoration. The Division has benefited from Corps programs that identified rare and endangered species and habitats, and significant prehistoric and historic sites shared by the two agencies.

The MA Department of Conservation and Recreation (DCR), Division of State Parks and Recreation (DSPR) leases about 250 acres of Division land for Rutland State Park, owns two former railroad lines, and is involved in helping to set policy for the Midstate Hiking Trail that crosses through Division holdings in the Ware River watershed. The DWSP and the DSPR work together on recreational activity concerns, including road maintenance and access problems. The Division has benefited from this relationship over the years in dealing with a variety of insect and disease problems in the forest.

4.3 DCR/DWSP-Controlled Land in the Ware River Watershed

4.3.1 Boundaries

Marking and maintaining land ownership boundaries is an important component of watershed protection. When boundaries are not respected and activities detrimental to the water supply occur, the protection value of these lands is diminished.

Many kinds of encroachments have occurred on Division property. These encompass a wide range of activities resulting in a variety of impacts on protection values. The following are examples of encroachments reported at Division boundaries in the past:

- Destruction of property through the removal of trees and plants, gravel, or topsoil; grading, paving, or filling of soil or ground cover; or removal or disturbance of boundary monuments, stone walls, or line trees.
- Impairment of water and soil through the dumping or storage of refuse or hazardous materials, grazing of animals, and manure storage
- Construction of buildings, docks, or fences

Illegal dumping on DWSP land

Boundary maintenance is the best means of reducing encroachment problems. Maintained, visible boundaries protect the integrity of property, provide a frame of reference for policing and monitoring, and are essential proof when a dispute or encroachment occurs. There are approximately 125 miles of boundary surrounding Division lands on the Ware River watershed. Most of this distance traverses remote areas between paved roads.

Several steps are needed to improve the Division's boundary maintenance program. First, a maintenance schedule will be established so that within each ten year management cycle all critical boundaries are brushed, painted, and reposted. During these visits missing or damaged bounds, encroachments, or problems will be noted, and the information passed to the superintendent. The Division is considering redesigning boundary tags to improve their visibility.

Secondly, to improve property identification and to improve monitoring, signs and markers will be erected where property lines intersect paved roads. This is especially important on the properties outside the General Taking (the original land purchase for the creation of the water supply system). All new acquisitions will be surveyed and bounded at the time of purchase to clearly identify property lines and reduce work required by in-house engineering staff.

The Division is considering alternatives to forestry personnel to accomplish boundary maintenance. This work could be contracted out to the private sector. A single contract could be written including all boundaries within the watershed, or an annual contract could be written for sections of boundary maintenance. Another option under consideration is the use of summer employees to maintain segments of boundary each year, although this approach would require monitoring to ensure consistency. Division engineering staff would have responsibility for supervision of boundary maintenance done through contracts or other agreements.

4.3.2 Role of DCR/DWSP Watershed Rangers in Land Protection

The Division controls about 42% of a 257,000-acre watershed and reservoir system, which provides drinking water for nearly 2.2 million people. While public access to this system is regulated by policy and by physical barriers such as gates, both appropriate and inappropriate uses occur throughout the year. For several decades prior to 1992, the Metropolitan Police, who had jurisdiction in any town that contained MDC property, patrolled the watershed system. In 1992, the MDC police force was consolidated with the State Police and other police departments. A Memorandum of Understanding was established with the MA State Police to provide the same services to the MDC watersheds that were carried out by the former Metropolitan Police. Following the consolidation, the MDC felt it would be prudent to create a limited ranger program to complement the efforts of the police, including rangers specifically assigned to watershed protection. MGL Ch. 92, s. 34b specifies the authority of these rangers, as follows:

"The Metropolitan District Commission is hereby authorized to establish a park ranger program within the department to preserve, maintain and protect the parks, reservations, historic sites and open space and to ensure the environmental integrity of properties under the care, custody and control of the commission."

Within the Mission Statement of the MDC Park Ranger Unit (which included Watershed Rangers), four primary objectives are identified:

1. Resource Protection: Park Rangers will provide active and visible uniformed patrols of MDC properties and facilities in an effort to discourage improper use and criminal activity. Park Rangers issue verbal or written warnings and non-criminal citations to individuals who violate MDC Rules and Regulations and contact the MA State Police to address criminal activity.
2. Visitor Services: Park Rangers will assist visitors to MDC properties by providing them with information as requested, rendering emergency service when necessary, and promoting educational and recreational opportunities through various programs and activities.
3. Education and Community Relations: Park Rangers will encourage appreciation and proper use of MDC resources through various outreach programs. This includes maintaining an active working relationship with park patrons, user/friends groups and the owners of private properties abutting MDC lands.
4. Reservation and Historic Site Management: Park Rangers will assist in proper maintenance and protection of properties and facilities by implementing measures for damage prevention, conducting routine on-site inspections, promptly reporting and documenting maintenance problems, and taking and documenting corrective action.

The primary function of the Division's Watershed Rangers is to protect drinking water resources by conducting regularly-scheduled patrols of the watersheds. Watershed Rangers provide a visual, uniformed presence on Division lands and pro-actively patrol to help solve problems, such as vandalism, inappropriate recreation uses, illegal dumping and accidents within the watershed that may degrade water, forest, wildlife and/or cultural resources. The Rangers rely on rules education rather than enforcement to seek compliance. Rangers do not have law enforcement powers. When situations occur that require law enforcement personnel, Watershed Rangers communicate these to the State Police and other enforcement agencies.

Watershed Rangers are "good will ambassadors" and not only show a positive presence but also speak on behalf of the agency and the Division about proper watershed stewardship and drinking water protection to community or other organization gatherings, children, school groups, service organizations, senior groups, etc. Through their positive interaction with visitors, rangers protect these open spaces and encourage all people to do the same by obeying all watershed rules and regulations for specific Division reservoirs and the system as a whole.

Watershed Rangers provide security for Division facilities and other designated buildings, and regularly monitor potential trouble spots on the watershed. Special use and group permits may be checked by Rangers to ensure that permittees are in compliance with their permit. Rangers keep a daily log of their patrolling activities. Incidents are documented and are referred to the appropriate authorities. Rangers also aid in placement of signage on Division lands throughout the watershed, to assure the public has ample opportunity to become informed about access regulations.

Since 1996, the number of Rangers assigned to the Quabbin/Ware River watersheds has grown from one to seven. Ranger patrols include pro-active surveillance of DCR/DWSP-owned lands with emphasis on popular access locations around the Ware River watershed. Watershed Rangers have monitored authorized activities, including: horseback and snowmobile rides; orienteering; fishing from shore and boats and ice fishing; camping and hunting in designated areas. Rangers also monitor and report on the condition of trails and signs, ice conditions on designated ponds, as well as illegal activities including dumping of trash and debris, ATV and off road vehicle use, fires, and target shooting. In addition, Watershed Rangers are trained as emergency first responders and have undertaken ice rescue training. During Fiscal Year 2003, Watershed Rangers spent an average of 16-20 hours per week covering responsibilities on the Ware River watershed.

4.3.3 Ware River Roads

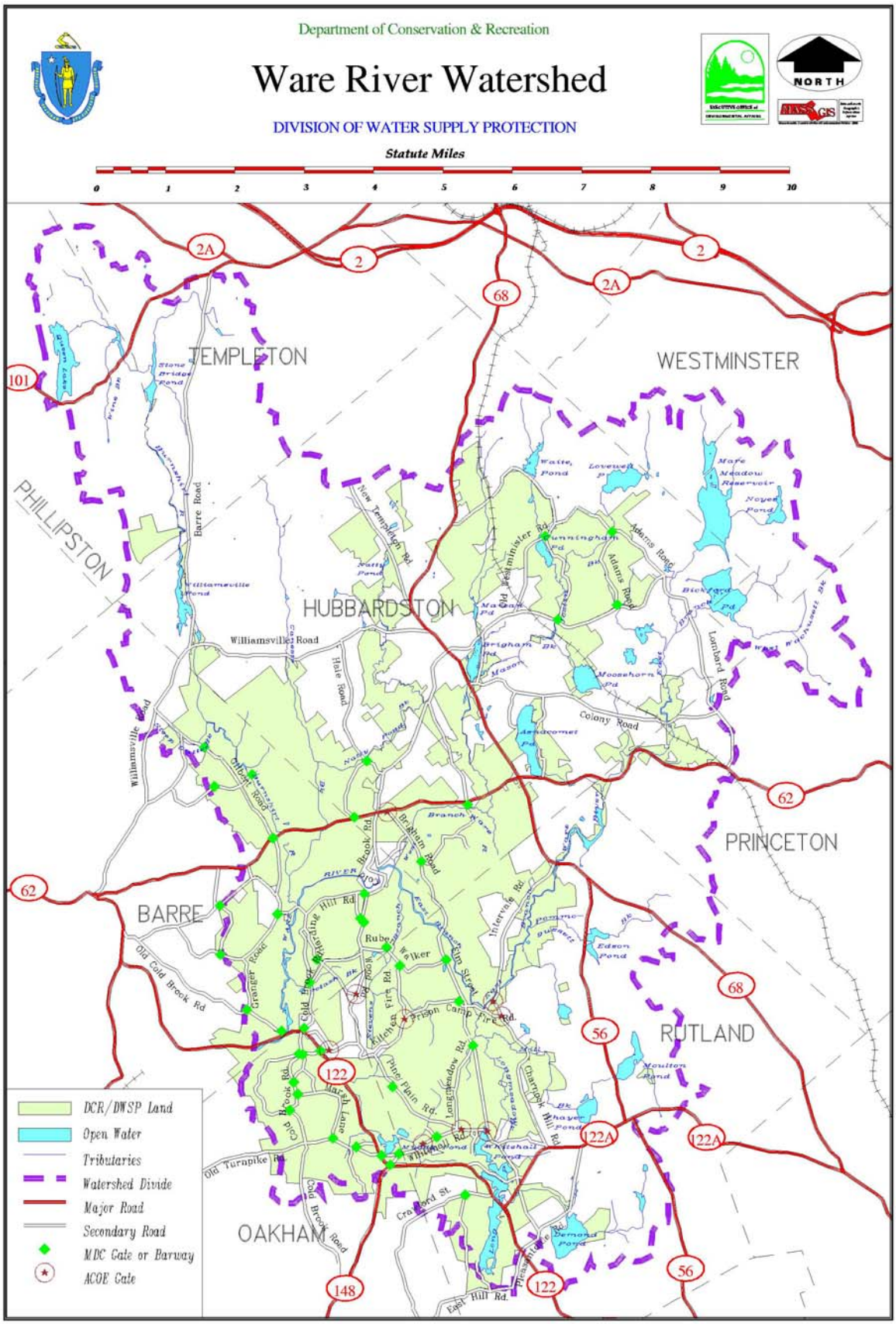
4.3.3.1 History and Current Condition


Historic Ware River road

Most roads on Division properties on the Ware River watershed are a legacy left from the communities that predate Division acquisition. They vary from well-built and maintained roads connecting adjoining communities to primitive farm lanes serving a single dwelling. Municipal roads that fell within the General Taking were discontinued by the four towns involved. Exceptions include the Old Worcester Road and the northern section of Gilbert Road in Barre and Ware, and the Barracks Hill Roads in Rutland. While historic, engineered town roads are generally still the highest quality roads on Division properties, these were built to accommodate smaller, lighter vehicles than are common today. Many of the lower quality roads originally provided access to fields, pastures and woodlots and were improved to various degrees by the MDC following reservoir construction. The present road system represents a fraction of the roads and ways that were in use during the height of 19th century agricultural activity in the region. An examination of any wooded parcel will reveal numerous wheel tracks leading from field to pasture to woodlot.

At the time of the General Taking, the Metropolitan District Water Supply Commission (now the DCR/DWSP) assumed control and maintenance responsibility from the towns for the gravel roads within its properties. In the first few decades, road use was light and maintenance requirements were minimal. In the 1960s, four-wheel drive trucks and recreational vehicles became popular and use of the watershed intensified. These activities severely damaged the access road system. There were limited funds and labor available to repair and maintain the roads.

FIGURE 4: WARE RIVER GATES AND ROADS



By the end of the 1970s some roads were impassable, some were usable only in the driest seasons and some could be used but only with the greatest caution. The combination of excessive use and deferred maintenance left conditions that were prone to erosion and tributary siltation during storm events.

It was apparent in the early 1980s, at the start of the last management period, that lack of access control was jeopardizing the Division's ability to maintain and protect watershed lands and associated water resources. To address the problem a program was presented in the last management plan to restrict vehicle access. A principal objective of this initiative was to reduce road maintenance by concentrating vehicle use on ways maintained as all-weather roads. Another objective was to limit vehicle access on steep gradient roads that are difficult to maintain and at greater risk to erode. A third objective was to temporarily abandon a portion of the road network that was deemed nonessential, in part to create some larger blocks of roadless forest.

During the 1980s, eight gates and forty culverts were installed in the DCR/DWSP road system at Ware River, and approximately 12,000 cubic yards of gravel were spread. In 1988, the Ware River Recreation and Public Access Plan was approved by the MDC. It formalized access restrictions, including seasonal and daily closings for roads, installation of gates (38 proposed), and restrictions on recreational vehicles. Coincidental with approval of the plan, the Division obtained the needed personnel and equipment to implement the program. During the early 1990s, the proposed vehicle access restrictions were put in place, and thirty-nine steel gates and sixty-eight barways were installed. During the same time period, approximately 18 miles of road were upgraded to an all-weather status by installing more than 100 culverts to improve drainage and by spreading approximately 20,000 cubic yards of processed gravel. At the same time, approximately 18.5 miles of access road were gated off and their status upgraded to allow limited use during most seasons of the year. Another 20.3 miles of roads were blocked and abandoned on a temporary basis. These roads may be opened up and used for short periods of time for emergencies or for management activities. In the subsequent decade, staffing was reduced following the completion of the upgrades. However, motorized access continued to increase as a result of improved travel surfaces and expansion of off-road motorized and non-motorized sports.

In order to maintain the stability of the Division roads on the Ware River, efforts will continue to be made to bring the level of use in line with the Division’s ability to repair, maintain, and improve the road system. Road repairs and improvements create a continuing dilemma in that these improvements generally result in greater public use. However, when repairs and improvements are not completed, both ATV and non-motorized traffic, including horse traffic, continue to expand while the ability of the Division to patrol and control use of these areas is limited. It is Division policy to maintain sufficient access to allow required management activities, within the constraints of staff and financial resources. Setting policies for non-management access is primarily the subject of periodically updated access plans for each watershed, but controlling unauthorized access will be a consideration in all management activities (for instance, closing and blocking access to log landings and skid trails at the completion of harvesting operations).

4.3.3.2 Road Maintenance Priorities and Objectives

The internal forest road network on Division lands in the Ware River watershed provides vehicle access for important watershed management activities such as forest management, fire protection, water quality sampling, patrolling and policing, and emergency vehicle access. The purpose of this section is to discuss the current state of the Division road network and maintenance needs. As mentioned above, in addition to the physical condition of the roads, the current Access Plan (most recent update January 2000) for the watershed determines the public, non-management use of all Division roads.

In total, the Division has care and control of approximately 57 miles of gravel access road on the Ware River watershed, as well as many miles of non-gravel road. There are three classes in the permanent road system, and a fourth class of temporary, non-gravel roads:

1. Class 1 roads are 10-14 foot wide, four season, permanent roads with adequate drainage and structure to sustain year-round use, if necessary. The road surface is processed gravel, and drainage (vegetated ditches) is adequate to protect the road surface under most conditions. These roads receive relatively high use and are generally kept open and passable from at least May to January, although subject to closing anytime that conditions warrant. (Coldbrook Road is usually plowed and left open through the winter for local access, but closed for periods in the spring). There are approximately 5 miles of Class 1 roads on the Ware River Watershed.
2. Class 2 roads are 10-12 foot wide, permanent roads that are closed seasonally. Class 2 roads were not constructed and are not maintained to withstand traffic during periods of frequent freezing / thawing, nor when the water table is high, although drainage is sufficient to protect the road surface during most climatic conditions. Class 2 roads are generally open from May 1 to January 1, unless unusual conditions require closing. The road surface is either bank-run or processed gravel, but these roads are at least partially vegetated during the growing season.
3. Class 3 roads are 8-12 foot wide, intermittent use, permanent roads. These are generally grass-covered roads that may or may not be gravel-based. Class 3 roads are maintained through periodic mowing and maintenance of drainage, but they are infrequently used, and public access is restricted except that some of these roads are open during hunting seasons. There are approximately 52 miles of road on Division properties in the Ware River watershed that are classified as either Class 2 or Class 3.
4. Class 4 roads are temporary roads used for timber harvest access by forwarders and/or skidders. Once harvesting is complete, these roads are stabilized, barricaded, and allowed to revegetate. As these roads are temporary, the number of miles of active Class 4 roads on the Ware River watershed is variable from year to year.

The proper maintenance of forest roads is important to both ensure reliable access and to minimize erosion and the resulting sedimentation of tributaries. A properly crowned road surface comprised of well-packed material with adequate drainage features should be the goal for all of the Class 1 and 2 roads on Division property. The Class 3 roads have less stringent requirements that may be met merely by the maintenance of a healthy grass cover and occasional restoration of drainage, and occasional restoration of proper crowning to direct water off the road surface.

During times when budgets are contracting, the actual miles of roadway maintenance that can be accomplished in any year will be less than needed to maintain optimal roadway stability. In order to complete the most critical maintenance projects first, strategies will be developed annually to prioritize the use of resources available in any given fiscal year

The greatest road-related threat to water resources is the crossing of streams and rivers by roads. Extensive research has demonstrated that improved design, building, and maintenance of roads can greatly reduce road-related surface erosion within sections of roadways. The most important implications of these studies for Ware River roads is to set the priorities on controlling use or the improvement of drainage structures and road surface conditions (crowning, and either gravel or vegetative surface, depending on traffic). The objective in all cases is to assure that the road is capable of handling the anticipated traffic load without compromising its ability to handle drainage needs.

In order to better understand the current state of roadway stream crossings, a survey is proposed for this management period to categorize the existing crossings, determine the potential threats to the water system, and propose potential mitigations. A GIS overlay of Ware River roads and water courses will be the first step in categorizing roads for maintenance priority. The following additional data will be collected for this purpose:

- *Class of road:* Class 1 roads, because of their size and traffic load, can produce greater sediment movement from road surface to streams than smaller, less traveled Class 2 or 3 roads.
- *Gates:* The current location of gates and the conditions/schedule for opening or closing these gates provides control over the annual use and therefore the maintenance requirements.
- *Slope:* The greater the slope the higher the erosion potential.
- *Drainage:* After a century of travel and maintenance, many of the historic town roads comprising the watershed road system are 3 to 5 feet below original grades. Sandwiched between historic stonewalls, roadside ditches become shallow and ineffective. These constraints inhibit the construction of relief ditches and drainage structures needed to dissipate storm water and meet the standards of agency Conservation Management Practices for road maintenance (described below). Where necessary, these roads will be blocked and abandoned until such time as a solution to the drainage problem can be designed and implemented.
- *Surface material:* The quality of road surface material can greatly affect erosion potential. Processed gravel, properly graded, crowned, and compacted, is the most common material used in reconstruction projects on the watershed. The USDA Forest Service routinely uses asphalt pavement on steep roadways crossing streams, but the Kelly-Wetmore Act prohibits "hardening of road surfaces" on Division properties. An impervious surface may increase the velocity of storm runoff but correctly designed can result in reduced migration of sediments from the road surface into streams. On lightly traveled roads a grass surface maintained by mowing can provide increased protection from sediment movement.

Division staff has determined the basic level of maintenance required to maintain the current network of roads on Ware River properties on an annual basis:

- Class 3 roads will be inspected and kept free of downed branches and debris. Water control structures will be cleaned, mowed, and maintained to prevent erosion. This includes the installation of water bars and/or dips and the recrowning of the road surface following a period of use of these roads for management purposes. As labor and materials are available, gravel (1.5" or smaller processed and bank run) will be utilized to strengthen the roadbed and crown and to top dress the travel surface of a portion of the Class 3 roads.
- Portions of Class 1 or 2 roads will receive upgraded drainage features. Grass-lined and riprap lined ditches will lead to retention basins that allow sediment to settle out before runoff enters surface waters. Drainage outlets that are currently directed toward surface waters will be redirected to upland areas.
- As resources allow, up to 18 miles of Class 1 or 2 roads will be graded and crowned, with ditches and culverts inspected and cleaned. 1.5" or smaller processed gravel will be placed as needed on these roadways to maintain contour, surface integrity, and stability.
- It is the Division's intention to limit washouts by replacing under-sized culverts with structures that will meet appropriate standards. Culverts will be inspected on Class 1 and 2 roads and those found to be sub-standard will be prioritized and replaced as labor and materials are available. At a minimum,

the Division intends to replace three small (12" to 18") culverts and one large (>36") culvert annually. In addition, the Division will work to continue installation of overflow spill areas (reinforced, low areas on a road adjacent to major streams) capable of spilling the flow from a 100 year flood (1% chance of occurrence in any given year) on major tributaries.

Current (2003) maintenance staffing in the Quabbin Section is at a bare minimum. In the past, Ware River maintenance staff included a Foreman, a heavy equipment operator and a laborer. As this plan is being written, the Foreman is retiring and the Maintenance Equipment Operator and Laborer positions are vacant. It does not appear staffing will return to former levels in the near future. Road maintenance projects at Ware River have traditionally been completed by supplementing the Ware River staff with equipment operators from the Quabbin Section watershed maintenance staff at the New Salem field office. These highly skilled operators with their specialized equipment are able to perform a wide variety of complex construction and maintenance tasks. Each year this group has spent as many as 6 to 8 weeks in the Ware River watershed working on larger projects. These have included: reconstruction of 30 miles of Class 1 and Class 2 roads, installation of the Ware River field office septic system, replacement of bridge decking on Comet Pond and Brigham Road bridges, and restoration of 20 acres of recently purchased property that had been cleared, with road and drainage infrastructure installed for a proposed subdivision. The Quabbin Section is in the middle of a reorganization effort. The New Salem crew will play a more direct role in maintaining access roads and security on the Ware River watershed. This will require assigning equipment operators and/or laborers as needed for routine maintenance tasks. This effort will focus on better prioritization of tasks to allow a smaller, skilled workforce using specialized equipment to more efficiently complete tasks. With this workforce in place, Quabbin Section staff will be able to complete high priority projects in the Ware River watershed.

To date, virtually all of the gravel used to maintain the Division's Ware River road system has come from Division-controlled pits. There are presently four active gravel pits from which material is being extracted for use, including the Grainger Pit, the Pond View Pit, Shaft 6, and Shaft 7. The Division's road maintenance equipment resources improved during the past decade. If budgets allow, this equipment will expand further during the coming management period, in order to facilitate a stronger focus on improving the drainage structures on the road network.

4.3.3.3 Conservation Management Practices for Road Maintenance

NOTE: DCR/DWSP has begun to use the Canadian term "Conservation Management Practices" to replace the older term "Best Management Practices", believing that it is more descriptive. Both terms refer to efforts to create resource-protecting standards for management activities.

It is widely understood that roads represent the greatest potential source of erosion and sedimentation on an otherwise forested watershed. The "natural" state of a forested watershed includes a topsoil and duff layer that has enormous infiltration capacity and allows rainfall to travel slowly and evenly toward surface waters, with a significant amount of filtering of sediments and nutrients along the way. The proper construction of a road requires that this filter layer be removed and replaced with a durable, compacted surface. The disruption of natural flow can be mitigated with proper drainage features and maintenance, although even the most carefully constructed and maintained road remains a greater threat to water quality than an adjacent, roadless forest. While roads are a functionally necessary component of watershed protection, their construction, maintenance, and use need to be carefully considered and controlled in order to limit their impact on water quality.

Roads passing through streamside riparian areas and crossing surface waters are associated with the most extensive potential impacts to water quality. Chronic transfer of sediments to surface water is

frequently associated with roads, and high concentrations of suspended sediments kill aquatic organisms and impair aquatic productivity. "Roads are especially important vectors of nutrients and other materials to aquatic ecosystems, because the buffering role normally played by riparian vegetation is circumvented through direct runoff of materials in water and sediment where roads abut or cross water bodies. Water moving on and alongside roadways can be charged with high levels of dissolved nitrogen in various forms, and sediment brings a phosphorus subsidy when it reaches surface waters." (Trombulak and Frissell, 2000) The highest priority for mitigation of road effects on water quality, therefore, should be to concentrate maintenance on road / water intersections.

The objectives of road maintenance on Division watershed lands are to provide for vehicle access to support key watershed management activities, and to minimize adverse water quality impacts associated with this road system. Activities that are dependent upon a good access road system include fire protection, forest management, water sampling, research, and ranger patrols. These activities require stable, properly-shaped and ditched road surfaces with adequate structures to manage stormwater.

To accomplish these objectives Division crews will use various mitigating procedures to protect stream water quality during routine maintenance and repair activities. These procedures are outlined below. It should be noted that specific sites might require special systems not described here, such as the use of geotextile, erosion control blankets, subsurface drainage, and riprap materials. In addition, wildlife conservation practices will be considered when constructing and maintaining roads (see section 6.3).

- *Shaping Road Surface*: The basic component of a stable road is the proper ditching and crowning of the road to allow stormwater to flow off the travel surface and be collected in the roadside ditch.
- *Relief Ditches, Relief Culverts, and Waterbars*: The frequent removal of storm water from the roadside ditch is important to limit the amount of soil and gravel that is washed from an area during an event. The spacing of the relief structures is determined by combining site data such as slope of the road, slope of adjacent woodland, soil type and depth, proximity to surface waters, and physical structure of the road. The general rule of thumb is to place relief structures as often as the landscape allows on most slopes. Relief structures, wherever possible, will not discharge stormwater within 50 feet from streams or wetlands.
- *Detention and Retention Basins:* These basins will be installed where needed during road reconstruction activities to reduce the velocity of stormwater and increase infiltration.
- *Dry Season Work*: Except for emergency repair work, some major bridge work (which may extend beyond dry periods), and emergency culvert maintenance or replacement, road work will generally be accomplished during dry periods (primarily summer), when low water flow and stable soil conditions will help mitigate impacts from soil disruption.
- *Use of Silt Fence/Hay Bales*: Whenever road maintenance work requires disturbance near wetlands, the wetland will be protected by properly installed hay bales and/or industry standard silt fence.
- *Seeding of Disturbed Areas*: Upon completion of road maintenance projects, areas of disturbed soil, including ditches and gutters will be graded and seeded with quick growing grass species. The Division has purchased a "hydro-seeder" for this purpose.
- *Special Road Surfaces*: Because of the huge variation of historical forest road construction and use, alternative road surface materials may be appropriate in limiting loss of material through erosion. Forest roads that are rarely used may be shaped and seeded with grass. Yearly mowing and culvert cleaning would then maintain these roads. Depending on location and use, these roads may also be blocked by use of barways to keep out all but essential traffic.

4.3.3.4 Internal Review Process for Developing Access Roads or Gravel Operations

Much of the roadwork conducted on the watershed is routine and of a maintenance nature. Occasionally, however, new access roads must be constructed, existing roads must be significantly upgraded, or new sources of gravel must be developed. In these cases, since the operation may result in habitat changes or produce potential impacts on water quality, wildlife, or cultural resources, the following procedure will be followed:

1. Develop a plan showing the location of the proposed work, the proposed timing for roadwork or gravel removal, and the procedures to be employed. The plan will include a detailed description and justification of the work and consideration of alternatives.
2. Consult with the Division Section Superintendent, Environmental Quality staff, Natural Resources staff, and Division archaeology staff to determine that no significant impacts will occur to water, wildlife, or cultural resources and to be certain that the staff, equipment, and resources required will be available to complete the work in the proposed timeframe.
3. Complete all necessary approvals and permits from other state or municipal authorities.
4. Acquire final approval from the Section Superintendent following consultation with and approval by the Director of Natural Resources.

4.3.3.5 Minimizing Traffic to Reduce Maintenance Needs

Some Division roads at Ware River are experiencing more traffic than they are capable of handling without environmental consequences. The Division intends to reduce use of its roads to a sustainable level, given current and anticipated maintenance staff and equipment levels. This can be accomplished through a variety of measures being considered during this next management period:

- Providing access to areas but not through-access can be accomplished by gating off roads in the middle, or leaving one end gated, creating dead-ends. In addition to reducing overall traffic, this practice may reduce illegal dumping.
- Terminating roads one or two hundred feet back from the water's edge allows the riparian area to recover while providing a better outdoor experience for visitors. Boulders are used to block motor vehicle access. This has already been accomplished in many locations along the major rivers.
- Temporary bridges and culverts installed for short-term access on Class 4 roads may be removed at the termination of the harvest, in order to discourage continued, unofficial use of these roads.
- Tops and slash generated during a timber harvest may be left in the Class 4 skidder and forwarder roads both during and after the harvest is completed. During the harvest, this practice buoys heavy equipment above the soil and reduces compaction. Following the harvest, the slash renders these paths impassable to recreational vehicles, and protects forest regeneration that will eventually return the road to a forested condition.

4.3.3.6 Long Pond Parking Lot

The Division proposes to reduce the Long Pond parking lot during this management period, although this project is a lower priority than upgrading drainage qualities on existing roads. This lot is currently approximately 2 acres in size, which greatly exceeds the needed capacity at the site. By reducing this lot to approximately 1 acre in size, and working to revegetate the remainder of the previous

acreage, the Division intends to increase the buffer between the lot and the pond and provide better protection of associated water quality.

4.3.3.7 Bridges

There are six existing bridge structures on lands under the care and control of the Division. Three of these provide access to Class 1 roads. Whitehall Bridge is a concrete and steel structure that spans the spillway at Whitehall Pond by Rutland State Park. Maintenance responsibility rests with the DCR Division of State Parks and Recreation under the lease agreement for the park area. A co-maintenance agreement exists between DCR/DWSP and the Army Corps of Engineers at Barre Falls Dam for Chickering Bridge on Elm Street in Rutland and Morey Bridge on Brigham Road in Hubbardston. This agreement was reached because the Corps periodically inundates these structures. The Army Corps rebuilt Chickering Bridge in 1987. The steel girders were repaired and the decking was replaced with concrete. The Division rebuilt Morey Bridge in 1991. The stone abutments were rebuilt, a new wooden deck was installed, and the approaches were improved. However, this bridge has been shut down because of a failure in the stone abutments and is no longer available for vehicular use. Repairs would require a major reconstruction project, for which funding is not currently available. A fourth bridge spans the spillway at Comet Pond that accesses private cottages along the eastern shore. It was rebuilt by Division personnel in 2002.

The remaining two bridge sites service Class 3 roads. Historically, Rice Road Bridge spanned the Burnshirt and Twin Hill Road Bridge spanned the West Branch. Both could provide access to large sections of Division property. In each case the stone abutments appear to be in good shape, but the bridge structures are non-existent. If access to these areas for management purposes becomes a high priority, these bridges will need to be rebuilt with structures that can accommodate gravel trucks and fire equipment. The Rice Road span has been successfully crossed with a temporary bridge in the recent past to allow a timber harvest to proceed. Following the removal of the temporary bridge, however, both ATVs and horses have continued to use the area by crossing the river directly. Rebuilding a permanent bridge would bring this traffic out of the water and would allow better patrolling of the area. However, this would also require significant resources to upgrade the approaches and to complete the bridge.

At two other locations bridge structures are absent. These service Class 3 roads, but again also service large areas of Division property. A bridge at the crossing on Lackey Lane at the Burnshirt River in Barre could provide alternative management and patrolling access to a large wooded area on the north side of the Ware River. At Harris Lane where it intersects with the East Branch, a bridge structure could provide the only access to new acquisitions on the east side of the river.

Efforts to reconstruct these bridges during this management period are a lower priority than completing construction and maintenance of drainage structures and travel surfaces on the existing road network at Ware River. If resources remain following the completion of higher priority projects, Rice Road and Harris Lane Bridges are the first priority among the proposed bridge upgrades, because they provide the only access to large areas. The bridges at Twin Hill and Lackey Lane are secondary because they only improve access to the areas they service. Design and construction will necessitate the services of a licensed structural engineer and will require a service contract.

4.3.3.8 Considering Beaver Populations in Long-term Planning for Access

Beaver populations in the state (and throughout the Northeast) continue to increase as the number of trappers and amount of human-caused mortality remain low. There are at least 100 culverts within the Class 1, 2, and 3 roads at Ware River. A majority of these are round, small-diameter steel culverts. The

Division constantly deals with beaver plugging of road culverts. In some situations, the Division has successfully installed fences and water level control devices. These solutions, however, require continual maintenance and do not offer permanent relief. Further, fencing and/or water-level control devices may not be useful in all problem situations on the watershed. For example, in New York State in 1993, only 3% of sites were suitable for water-level control devices (Jensen et al., 1999). In situations where water level control devices are not an option, the Division removes beaver by either trapping or shooting individual animals. Although this solution may offer immediate relief, the habitat and conditions that attracted beaver initially have not been altered and these sites are often re-colonized within a short period of time. The Division recognizes the limitations of these various techniques and is working to develop a long-term plan for beaver management along roads.

Recent research suggests several management techniques to protect against beaver plugging of culverts. In 81% of sites examined in New York State, culvert size (area of inlet opening) was the major determinant of whether beaver plugged the pipe. The probability of a culvert being plugged increased with decreased culvert inlet opening area. Culverts with just 8 ft^2 of area were plugged 73% of the time, while culverts with 113 ft^2 of area were only plugged 7% of the time. Further, the design of the culvert was also an important determinant of whether beaver altered the site. Pipe-arch culverts were less prone to being plugged by beaver than round culverts. Round culverts are more likely to channel the water and reduce the stream width, alter flow rates, and generate noise that attracts beaver. Unplugged pipe-arch culverts tended to retain the natural stream width. The width of the stream at plugged culverts was twice that of the culvert inlet opening (Jensen et al., 1999).

Both research and general observations suggest that beaver are more likely to occupy sites with lower gradient and smaller width streams (e.g., first or second order), as well as abundant woody vegetation. In areas with flat topography, the total amount of woody vegetation was the primary predictor of beaver presence in New York State (Jensen et al., 1999). Because each site can be evaluated for potential beaver habitat and the probability of culvert plugging, the DCR/DWSP will incorporate beaver considerations in choosing stream crossing methods. In addition to evaluating watershed area, road classification, and stream size and gradient, DCR/DWSP personnel will also consider potential beaver habitat during replacement or installations of culverts. Culverts that may already be experiencing chronic beaver plugging will be prioritized for upgrading or replacement.

4.3.3.9 Management Guidelines for Beaver and Road Stream Crossings

DCR/DWSP will incorporate beaver management considerations into road and culvert planning when possible to reduce the probability of culverts being plugged by beavers. Recommended practices include the following:

- Where feasible and applicable, replace existing smaller culvert pipes with larger, oversized pipes.
- When possible, box or pipe-arch culverts should be used with a minimum inlet opening area of 18 ft^2. Smaller sizes are easily plugged.
- When sizing the culvert, it is important that the width of the culvert inlet is at least equal to or greater than the width of the stream. This will decrease noise and minimize the potential for altering flow.
- When installing culverts, avoid creating a depression or pond at the inlet as these are attractive to beaver.
- Installing multiple smaller pipes at a site instead of a larger pipe is not a workable alternative. Smaller pipes are much more likely to be plugged.

- In situations where beaver have a history of plugging even large culverts, other management options may be needed (see section 6.5.1.4.2).

4.3.4 Fire Protection

Except in periods of severe drought, wildfires do not pose a serious threat to the Central New England forest. Due to the high moisture content of forest stands, dead wood and other organic matter decompose quickly limiting the accumulation of fuels. Because of their fire resistance these forests are sometimes referred to as "asbestos forests." Human carelessness or arson causes the majority of fires, which most often occur during a narrow window in spring when dry grass and leaves warmed by intense sunshine become extremely flammable. These early spring fires burn quickly through the understory generally killing trees and shrubs <1" in diameter and can cause damage to larger trees resulting in the introduction of insect or disease. There is potential for limited short-term impacts where wildfires occur in close proximity to riparian systems. These same fast-moving spring fires induce germination of many plant species that quickly fill the gaps, stabilizing the soils and sequestering nutrients. Because of the limited acreage (average <10 acres/year on Division properties) most of these fires have little impact on the system's water quality.

In drought years, large scale uncontrolled wildfire can pose a serious threat to the protection values provided by the forest. Severe burns can consume the forest overstory, understory, and the organic soil layers, exposing the mineral soil below. The threat to water quality posed by larger fires is related to the scale of the burn and its proximity to water resource areas. In dry years, the cumulative effects of many small burns may also present a water quality threat, especially if these are concentrated on individual sub-watersheds. Potential impacts may include increases in overland flow, erosion, and nutrient loading. Where organic layers are destroyed by fire, these effects may be prolonged during the protracted recovery of vegetative cover on the burn site. In recent decades, fires have impacted only very small areas of DCR/DWSP watersheds. These fires ranged from light burns where only the understory was impacted to intense burns that killed mature trees, but all of these recent fires were rapidly controlled either naturally or through human intervention, and none imposed significant threats to water quality.

4.3.4.1 Policy

The following improvements in DCR/DWSP fire policy were implemented during recent years and have significantly enhanced the Division's ability to quickly suppress wildfires:

- Improved cooperation with local fire departments.
- Improved forest road conditions in areas of poor access and high fire hazard and risk.
- Improved training in fire suppression for DCR/DWSP staff.
- Implemented a fire watch during extreme fire situations.

A fire policy was established in 1987 and has been revised several times, most recently in January 1993. The policy outlines the procedures followed to notify personnel and the steps taken to suppress wildfires on Division lands. The fire policy, in conjunction with better coordination between DCR/DWSP, DCR/DSPR and local fire departments has improved fire response time and suppression efforts. This is attributable in part to the installation of a radio link with DCR/DSPR fire control personnel. The Division provides assistance to the local fire departments, and only assumes responsibility for suppression when directed by the local fire chief (usually for "mop up" operations, to

extinguish embers remaining after the main burn has been suppressed). Improvements in fire suppression have been aided by the acquisition of new fire fighting apparatus and by improvements at the Ware River in gravel access roads and controlling public vehicle access through installation of security gates (which reduces the threat of ignition by recreational users).

Part of the fire policy includes provisions to close the watershed lands to all visitors under conditions of extreme fire danger. This measure will be taken during drought periods when the Division of Fire Control has rated fire risk as "Extreme" for five consecutive days.

4.3.4.2 Training

Timely and adequate response to the normal wildfire pattern on DCR/DWSP properties has been successfully provided by local firefighters, aided by DCR/DSPR and DCR/DWSP crews. However, the fire danger associated with severe drought is difficult to predict. On several occasions in the past decade the watersheds have been on the edge of serious drought conditions only to be relieved by major rain events. Nonetheless, dangerously dry periods are likely to occur in any given decade. In order to provide conservative protection for the water supply in the event that fire frequency throughout the region increases and outside crews become overwhelmed, there is a clear need to have an adequately trained and equipped wildfire fighting staff in-house, ready to deploy when needed.

Forest fire suppression techniques have not changed dramatically in the past 50 years. Western firefighters shovel and bulldoze dirt and employ aerial water and chemical attacks while eastern firefighters rely on ground delivered water as the dominant suppression tools. The ecological effect of suppression has been the subject of extensive debate in recent years. Many conservation organizations, including The Nature Conservancy have argued that fire suppression activities may exacerbate ecosystem degradation from wildfire. This degradation can occur by allowing the accumulation of fuels that eventually lead to much hotter fires than occurred historically, as well as through the direct impacts on the ecosystem resulting from fire suppression techniques. In conjunction with local fire departments and other state agencies, DCR/DWSP will continue to train personnel in alternative firefighting techniques that can minimize soil disturbance and the long term impacts on water resources. These may include more effective use of hand tools, environmentally friendly foaming agents, backfires, and the use of existing features such as roads and trails as firebreaks (rather than creating new breaks).

To participate on the DCR/DWSP fire crew, staff must have taken National Parks Service approved Wildfire Control Training and must have participated in a wildfire/controlled burn or attended approved training within the last two years. At present, twenty-three employees are certified and available to participate in fire suppression operations. A Fire Coordinator and assistant Fire Coordinator have been designated and they receive additional intensive fire control training.

4.3.4.3 Controlled Management Burns

Annually, DCR/DWSP staff participates in a number of controlled management burns on Division lands. Controlled management burns are deliberately ignited, controlled, and extinguished to burn over a designated area for a specific reason. These burns provide valuable training in equipment handling and in fire behavior, as well as a management tool to create or maintain desired habitat conditions that may be difficult to manage using other techniques. These burns have been used to maintain open non-forested habitat conditions, and may in the future be used to establish regeneration or control invasive plant species in forest stands.

4.3.4.4 Equipment

In the past ten years, the Division has made significant progress in properly equipping its fire control staff. New hose, floating pumps, a 250-gallon tank and pump fitted on the Division's logging skidder, and one 200-gallon and two 100-gallon slip-on tanks to mount on existing vehicles provide significant additional fire protection for the watersheds.

4.3.5 Transfers, Leases, and Agreements

In the mid 1950s the MDC transferred about 550 acres to the Army Corps of Engineers at Barre Falls for flood control purposes. The transfer consisted of two nearly equal parcels, one containing the main dam and the other containing the dike area. In addition, the Corps acquired a flooding easement on about 1,800 acres. In the early 1960s the MDC sold several hundred acres to the City of Fitchburg in the northeast section of Hubbardston for the development of a municipal water supply. This included land on Bickford Pond and the area now flooded by Mare Meadow Reservoir. In 1961, the MDC leased 1,300 acres to the Department of Environmental Management to develop a recreation facility at Whitehall and Long Ponds (Rutland State Park). The lease expired in 1986 and was renewed for 230 acres adjacent to the bathing area. The Division has entered into an agreement with the Division of Fisheries and Wildlife that permits DFW to post approximately 5,000 acres as wildlife management areas. These are located at the former Cunningham Estate and around Barre Falls Dam.

4.3.6 Rights-of-Way

Requests for new or revised Rights-of-Way (ROW) are primarily received from electric power companies, railroads, telephone companies, and town utilities. Requests are considered on a case-by-case basis. The primary consideration of the review is to prevent adverse environmental impacts to any watershed resource. The applicant must agree to follow all applicable regulations and specific terms and conditions proposed by the Division before the ROW is approved and any construction is permitted to proceed.

Maintenance of utility and railroad rights-of-ways follows procedures for resource identification and notification established in a 1997 document entitled: *Memorandum of Understanding between the Massachusetts Department of Food and Agriculture, Pesticide Bureau and the Metropolitan District Commission, Division of Watershed Management, on: Identification of Water Features within the Quabbin, Ware and Wachusett Watersheds, which are subject to protection under DFA Pesticide Regulations 333 CMR 11.00.* As these rules are updated and revised, Division staff will implement any changes that may be promulgated by the Department of Food and Agriculture.

4.3.7 Land Disposition Policy

The Division regularly comes under pressure from both private and municipal parties for disposition of Division lands for purposes that may be inconsistent with drinking water supply protection. While there are certain areas of land ownership throughout the water supply system that may not be of critical importance to water supply protection, these areas require careful scrutiny prior to disposition. The Division will consider land disposition only under exceptional circumstances. The DCR/DWSP Land Disposition Policy, approved in April, 1998, provides a framework for the agency to properly discharge its obligations to protect the water supply and to protect the Commonwealth's broader interests

in open space protection under Article 97 of the Constitution of the Commonwealth. The intent of the Watershed Land Disposition Policy is to provide additional watershed-specific instructions to the Executive Office of Environmental Affairs on disposition of Article 97 lands.

4.4 Land Acquisition

The three active Division watersheds have been included in the land acquisition program since its inception in 1985. While a preponderance of the available acquisition resources have been used to acquire acreage on the Wachusett Reservoir watershed (highest priority), sensitive lands have also been protected on the Quabbin Reservoir and Ware River watersheds. The purpose of the land acquisition program is to acquire sensitive watershed land and to protect it from urbanization and then to restore and/or maintain stable forest cover on this land. Few sites already developed or significantly disturbed are acquired. Instead, relatively undisturbed lands are purchased as a preventative measure, countering potential threats to water quality that would result from development of these lands.

To help determine which parcels would provide the greatest water quality protection for the money spent, MDC/DWM developed land acquisition models, first for the Wachusett and then, in 1998, the Ware River watershed. The Ware River model was developed by MDC and MWRA staff with help from the Department of Natural Resources Conservation at the University of Massachusetts, Amherst. The model, employing 12 weighted criteria, addresses the "varying source" assumptions incorporated in modern hydrologic models. Land in and around tributaries, aquifers, and wetlands will contain the greatest proportion of a basin's water at any given time. Studies of small New England watersheds emphasize the importance of low lying, water-rich areas in contributing the majority of runoff during storm events through saturated surface and subsurface flow (Dunne and Leopold, 1978, and Hewlett and Nutter, 1969). As a precipitation event continues, the area contributing to saturated flow increases. It is believed that this "variable source," however severe the storm event, includes less than half the watershed area. Pollutants introduced to these water-rich sources are more likely to impact tributary water quality than those introduced on non-source areas.

The Ware River model objectives were: a) to develop a land parcel prioritization ranking to protect water quality; b) to develop a method to evaluate relative time-of-travel distribution on a landscape; and c) to identify locations in the watershed that are most sensitive to water quality degradation. The model applies a number of watershed protection criteria to generate a relative sensitivity measure for any given parcel. The model shows that low priority areas (i.e., low sensitivity areas) cover the highest percentage of the watershed. The more watershed protection criteria that apply to any given area (i.e., high sensitivity areas), the lower the percentage of the watershed represented. By focusing land acquisition resources on these highly sensitive acreages, maximum benefits are achieved with respect to water quality.

Since 1985, the Commonwealth has acquired, 3,255 acres (2,715 in fee & 540 in conservation restrictions) for watershed protection on the Ware River watershed, bringing the total holdings to 23,694 acres (including 787 acres of CRs), or 38.2% (up from 31.3% in 1985) of the watershed. Expenditures for this acreage total $12.3 million. Funding for the watershed land acquisition program has come from the 1983 Open Space Bond ($3 million), the 1987 Open Space Bond ($30 million), and the Watershed Protection Act of 1992 ($135 million). Approximately $15 million remains available for land purchases ($3 million per year through 2008) within the watershed system. Most of these funds will be spent purchasing land on the Wachusett watershed, which is the least protected basin, with 26% under Division control. Efforts will continue toward purchasing a number of previously identified key parcels throughout the Quabbin Reservoir and Ware River watersheds. Ware River subwatersheds were prioritized by the Land Acquisition Policy Panel (LAPP) as part of the model development work. Based

on proximity to the intake and suspected travel time parameters, the order of priority for land acquisition in the major Ware River subwatersheds are:

1. Parkers Brook (mostly Division controlled – very few acquisition opportunities).
2. Burnshirt and Canesto Rivers, and Natty Pond Brook;.
3. East and West Branch Ware River above the Army Corps dam.
4. Mare Meadow.

Accordingly, the decision was made to concentrate most future Ware River watershed land acquisition efforts on the Burnshirt and Canesto River subwatersheds, as well as Natty Pond Brook subwatersheds.

4.5 Protection of Privately-Owned and Community-Owned Land

4.5.1 Conservation Restrictions

Acquiring conservation restrictions from watershed landowners is another form of land protection utilized by the Division. Conservation restrictions constitute a partial acquisition of rights to land ownership, usually in the form of development restrictions. In these cases, the Division agrees to acquire limited rights to property and to record these rights as an attachment to a landowner's deed. The landowner remains the owner and retains all rights to ownership except those described in the easement. This is a "less than fee" acquisition.

Conservation restrictions (CRs) are the preferred method of land protection because:

- Some landowners prefer to continue owning their properties despite agreeing to restrict its use.
- Landowners remain owners of record and continue to pay property taxes directly to the town which eliminates the obligation for the Commonwealth to make payments-in-lieu-of-taxes.
- The land is given equal value to fee acquisitions as protected open space.
- The costs of protecting the land are less than fee acquisitions.
- The costs of managing the lands as fee holdings are eliminated (though an annual CR monitoring inspection is required).

Of paramount importance to the Division is the protection of water quality. Any easement acquired by the Commonwealth for watershed protection must help insure the maintenance of a pure public drinking water supply. To this end, it is the policy of this agency to expend funds for the purchase of conservation easements only on acreage with uses, both present and projected, that do not conflict with this goal. Land uses and practices expressly excluded from consideration for easement purchases include:

- Dwellings
- Septic systems and leach fields
- Storage, stockpiling, or use of hazardous materials, petroleum products
- Pesticides and herbicides, manure and fertilizers
- Livestock
- Tillage
- Excavation of gravel, loam, peat, and/or rock except as incidental to land maintenance

- Use by the general public of horses or motorized all-terrain vehicles including snowmobiles, 4WD recreational vehicles, and motorcycles (Division assistance with gates and signs to limit access may be available upon request)
- Timber harvesting or tree cutting not in compliance with the Massachusetts Forest Cutting Practices Act (MGL ch. 132) and Division Conservation Management Practices for forest management
- Use of conservation restriction land to satisfy any zoning requirements on adjoining unrestricted property
- Construction of any new roadway for purposes of accessing unrestricted land for development purposes
- Any subdivision of conservation restriction land without Division approval
- Any other uses considered by DCR/DWSP to be detrimental to watershed protection

Continued use of the property by its owners for forestry, wildlife, recreation, and privacy purposes is encouraged. Conservation easements do not require owners to make their land accessible to the public, but the Division reserves the right to periodically enter the property to inspect for continued compliance.

After a property has been acquired a baseline study is conducted by the Division with the landowner to get a land use history of the property and to photo document the land as it is at the time of the purchase. Conservation restrictions are then monitored once a year to ensure compliance with the Order of Taking. Boundary tags may be put up on the conservation restriction to help determine the CR boundary and to help discourage abutters from encroachment.

4.5.2 Payments In Lieu of Taxes (PILOT)

After land is acquired for watershed protection, the DCR/DWSP is required by MGL ch. 59, s5G to make Payments In Lieu of Taxes (PILOT) on these properties. This law took effect for Ware River watershed lands in 1987. The PILOT amount is calculated by multiplying the local commercial tax rate by the land valuation as determined by the Department of Revenue (DOR). While the program is administered by the DCR/DWSP, the PILOT funds come from the MWRA. The DOR is required to value the land at its "highest and best" use; this means that property that is under Article 97 open space protection is still valued as developable parcels. A key provision of this statute is that the PILOT amount can never be less than the previous year's amount, even if the tax rate or valuation diminishes. In FY2003, PILOT distributed $731,734 to Ware River watershed communities as follows:

Community	PILOT FY2003
Barre	$129,668
Hubbardston	$238,371
Oakham	$77,760
Rutland	$285,401
Templeton	$534
Total PILOT Ware River Watershed	$731,734

Revaluation of state property occurs, by law, only once every five years. Unfortunately for the communities, this means that any property acquired within this cycle will not be included in determining PILOT amounts. However, the Division does pay the remainder of the existing year's taxes at the time of

acquisition, and if the sale occurs in the second half of the fiscal year, it is obligated to pay the following year's taxes as well. Furthermore, if a property is being purchased out of Chapter 61 or 61A (the Forestland Taxation program), the agency is required to pay "rollback" taxes to the town, rebating the previous four years' tax abatements.

The state lands revaluation by the Department of Revenue that concluded in June of 2000 placed the value of Division property in Ware River watershed communities at $51 million, which is more than 80% greater than the 1995 valuation. This increase, which took effect with the FY2001 PILOT, reflects both the additions in Division land ownership (particularly of valuable "prime lots" that could have been developed) and the rise in property values throughout the watershed. Starting in FY2001, the PILOT program will annually distribute a minimum of approximately $725,000 to the Ware River watershed communities.

Community	DOR Property Valuation FY2000	DOR Property Valuation FY2001	% Property Value Increase	PILOT FY2000	PILOT FY2001	%PILOT Increase
Barre	$4,599,595	$9,315,200	103%	$105,565	$129,668	23%
Hubbardston	$7,247,618	$16,798,500	132%	$118,933	$238,371	100%
Oakham	$5,161,383	$5,775,100	12%	$70,467	$76,982	9%
Rutland	$10,470,439	$18,814,300	80%	$142,922	$277,135	94%
Templeton	$32,185	$28,600	-11%	$469	$469	0%
Total Ware River Watershed	$27,511,220	$50,731,700	84%	$438,356	$722,625	65%

The PILOT program provides a significant benefit to the Ware River watershed communities. They receive the same revenue from permanently protected open space that they would have received from developable land, without the associated municipal costs of police, school and fire services. DCR/DWSP will continue to implement the PILOT statute, work with the MWRA to ensure proper payments, and assist the DOR in its revaluation efforts.

4.5.3 Technical Assistance to Communities

The Division recognizes the unique "home rule" land use authority vested in Massachusetts municipalities. Most of the specific planning and regulatory tools and techniques that comprise watershed protection (for areas outside direct Division jurisdiction) must be adopted at the municipal level through town meetings, and enforced by local volunteer boards. To improve local programs for water protection, the Division adopted the role of advocate and advisor. The Division's Community Technical Assistance work is aimed at a single goal: to use and improve the watershed protection afforded by local land use control programs.

In working with watershed area officials and citizens, the Division tries to find common ground on resource protection issues. The Division stresses that combined efforts help both local resources and the metropolitan Boston water supply. The technical assistance programs emphasize local source protection and its immediate impact on watershed residents and decision-makers. Through a cooperative approach, the Division improves land-use planning, control of development, and general environmental

protection at the local level. There are three main avenues through which the Division provides municipal technical assistance:

Meet regularly with local boards. On a monthly or as-needed basis, Division staff has attended regular meetings of local boards, such as the planning board, board of health, and conservation commission.

Provide direct technical assistance support to local boards and community organizations. Upon request from communities, through regular contact at board meetings and/or through regulatory review process, the Division offers professional expertise and Division resources (e.g., project review, contract development, and GIS maps). This type of in-house technical assistance is intended for small projects, whereas large or complex requests would be recommended for outside consultation, with Division support if possible (see next item, DWSP grant program).

Provide funds through a competitive grant program. In order to strengthen local planning capability, the Division provides funds, when available, to help watershed communities develop and implement comprehensive planning projects. $150,000 has been distributed to Ware River towns since this program was initiated with the passage of the Watershed Protection Act in 1992. A competitive application process was instituted in FY2002 to help evenly distribute these funds, when available, throughout the Watershed System. A $25,000 contract was awarded to Rutland through this program.

4.5.4 Technical Assistance to Private Forest Landowners

The Division started a program in 1995 to provide direct technical assistance to forest landowners at the Wachusett Reservoir watershed, where nearly 50,000 acres of unprotected forest lands existed. The Division hired a Private Lands Forester, with funding provided jointly by MDC and the USDA Forest Service. This forester assisted DEM foresters in administering MGL ch.132 (the Forest Cutting Practices Act) on the Wachusett Reservoir watershed. In order to increase landowner participation in Chapter 61 and the Stewardship programs, the Division contracted to hire private consultant foresters to complete forest management plans for landowners wishing to gain entry into these programs. In FY 95, $40,000 was dedicated to completing plans for approximately 2,000 acres of private forestland and to cost-share practices that benefit the watershed, such as tree planting and erosion control on roads. The Private Lands Forester worked closely with the Land Acquisition Coordinator so that lands that should be added to acquisition lists (due to imminent development, etc.) could be more easily identified. The Land Acquisition Coordinator also directed landowners with a strong aversion to selling their land to the Private Lands Forester, so that intermediate protection measures (Ch 61 or Stewardship) could be utilized.

At the conclusion of the contract for a full-time Private Lands Forester, the Division shifted responsibilities for maintaining the private lands stewardship program to the staff in the Natural Resources Section. The program has continued with additional Division funding and as of July, 2003, 64 properties totaling 4,556 acres had completed 10-year land management plans. Thirteen of these completed properties are located within the Ware River watershed, totaling 803 acres. The average cost to the Division to provide this protection through private land management plans is approximately $12 per acre.